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INV2500-HS and INV5000-HS
TELECOM INVERTERS
OPERATING MANUAL

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UNIPOWER Telecom, Division of UNIPOWER Corporation

NORTH AMERICA • 3900 Coral Ridge Drive, Coral Springs, Florida 33065, USA • Tel: +1 954-346-2442 • Fax: +1 954-340-7901 • sales@unipower-corp.com
EUROPE • Parkland Business Centre, Chartwell Road, Lancing BN15 8UE, ENGLAND • Tel: +44(0)1903 768200 • Fax: +44(0)1903 764540 • info@unipower-europe.com

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INV2500-HS AND INV5000-HS TELECOM INVERTERS OPERATING MANUAL

1.0 INTRODUCTION

1.1 This Operating Manual should be read through carefully before installing and operating the INV2500-HS inverter modules or INV5000-HS inverter systems. See Figure 1.

1.2 The INV2500-HS is a 2500 volt-ampere hot-swap, telecom inverter module. It converts a nominal 48VDC input into a 115VAC output at 50 or 60Hz. These modules are designed to go into a 19-inch, hot-swap compatible shelf, INVR2U-HS, which holds one or two units. When two units are used in this shelf they are automatically connected in parallel and synchronized to produce 5000 volt-amperes at 115VAC output (44 amperes). Or they can be operated in a 1+1 redundant mode at 2500 volt-amperes.

1.3 For 230VAC output at 50 or 60 Hz there are two other inverter models, designated INV5000-HS-230, which use two INV2500-HS units connected in series in their shelf to give the higher voltage. See the product line designation in Section 3.0. The output is 230VAC at 22 amperes, or 5,000 volt-amperes.

1.4 The 48VDC nominal input has a range of 42 to 56VDC. The inverters achieve 90% efficiency and 7VA per cubic inch power density. Input and output are both circuit breaker protected. They have high surge capability for starting loads such as motors, but the output breaker quickly trips if power attempts to flow back into a faulted inverter.

1.5 These inverters can be paralleled for higher output power or for N+1 redundant applications. They are fully isolated from the battery. Front panel LEDs indicate inverter status, and Form C relay alarm contacts are available on the back. The units are self-cooled by internal fans.

2.0 IMPORTANT FEATURES

The following is a summary of the important features of the INV2500-HS and INV5000-HS inverters:

- Two Mounting Positions High: 3.5 Inches
- 2500VA Output for INV2500-HS

(a). INV2500-HS Inverter Module

(b). INV5000-HS Inverter System

Figure 1. INV2500-HS and INV5000-HS Inverter Models

- 5000VA Output for INV5000-HS
- 7VA per Cubic Inch Power Density
- 115VAC Output at 22 or 44 Amperes
- 230VAC Output at 22 Amperes
- Low Distortion 50 or 60Hz Sine Wave
- 42 to 56VDC Input
- Fully Isolated from Battery Input
- 90% Typical Efficiency
- Up to 300% Surge Capability
- Powers Reactive Loads
- Circuit Breaker Input & Output Protection
- N+1 Redundant Operation
- 19- or 23-Inch Rack Mounting
- Overtemperature Protection
- Form C Relay Alarm Contacts
- LED Status Indicators
- Rear Safety Cover on Shelves

3.0 PRODUCT LINE

Table 3-1 Telecom Hot-Swap Inverter Modules

MODEL	INPUT	OUTPUT	FREQ.
INV2500-HS-60	42-56VDC	115VAC@22A	60Hz
INV2500-HS-50	42-56VDC	115VAC@22A	50Hz

Table 3-2 Hot-Swap Inverter Shelf

MODEL	RACK SIZE	HEIGHT	CAPACITY
INVR2U-HS	19 or 23 Inches	2RU (3.5 Inches)	2 INV2500-HS

Table 3-3 230VAC Inverter Systems

MODEL	INPUT	OUTPUT	FREQ.
INV5000-HS-230-60	42-56VDC	230VAC@22A	60Hz
INV5000-HS-230-50	42-56VDC	230VAC@22A	50Hz

4.0 SAFETY WARNINGS

4.1 These telecom inverters have hazardous external and internal voltages. They should be handled, tested and installed only by qualified technical persons who are trained in the use of power systems and are well aware of the hazards involved.

4.2 The input and output terminals are at hazardous voltage potentials. Do not touch these areas when power is applied.

4.3 When operating these inverters, the chassis ground terminal must be connected to safety ground to minimize electrical shock hazard and to ensure low EMI (electromagnetic interference).

4.4 The internal voltages are at hazardous potentials. The inverter covers should not be removed. There are no user-serviceable components in these units. Removing the covers of the inverters will void the warranty.

5.0 WARRANTY

All products of UNIPOWER Telecom, a division of UNIPOWER Corporation, are warranted for two (2) years from date of shipment against defects in material and workmanship. This warranty does not extend to products which have been opened, altered or repaired by persons other than persons authorized by the manufacturer or to products which become defective due to acts of God, negligence or the failure of customer to fully follow instructions with respect to installation, application or maintenance. This warranty is extended directly by the manufacturer to the buyer and is the sole warranty applicable. EXCEPT FOR THE FOREGOING EXPRESS WARRANTY, THE MANUFACTURER MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. As the sole and exclusive remedy under this warranty, the manufacturer, at its option, may repair or replace the non-conforming product or issue credit, provided the manufacturer's inspection establishes the existence of a defect. To exercise this remedy, the buyer must contact the manufacturer's Customer Service Department to obtain a Return Material Authorization number and shipping instructions. Products returned without prior authorization will be returned to buyer. All products returned for repair must be shipped freight prepaid to UNIPOWER. If the buyer fails to fully comply with the foregoing, the buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property or any other incidental or consequential losses) shall be available to the buyer.

6.0 UNPACKING AND INSPECTION

6.1 This INV2500-HS or INV5000-HS was carefully tested, inspected and packaged for shipment from our factory. Upon receipt of the unit, it should be carefully unpacked and inspected for any damage in shipment.

6.2 If there is evidence of damage, do not attempt to test the unit. The freight carrier should be notified immediately and a claim for the cost of the inverter should be filed with the carrier for direct reimbursement. Be sure to include the model and serial number of the damaged unit in all correspondence with the freight carrier. Also save the shipping carton and packing material as evidence of damage for the freight carrier's inspection.

6.3 UNIPOWER Telecom will cooperate fully in case of any shipping damage investigation.

6.4 Always save the packing materials for later use in shipping the unit. Never ship the inverter without proper packing.

7.0 DESCRIPTION OF OPERATION

7.1 The INV2500-HS modules employ MOSFET and IGBT power semiconductor switches with advanced, high-frequency, pulse modulation techniques to produce a low-distortion, 50 or 60Hz sine wave output with 90% efficiency and 7VA per cubic inch power density. A synchronization circuit lets two or more inverter modules operate in parallel with their outputs in phase-synchronization and current shared.

7.2 The INV5000-HS-230 inverter system consists of two INV2500-HSs operated in series for a 230VAC output at 5,000 volt-amperes (22A). The series connection of the units is made internally in the shelf. Each of the two inverter modules has its own input and output breakers, indicator LEDs and Form C relay contacts. The two inverter modules in the INV5000-HS are different in that their outputs are 180^{o} out of phase with each other.

7.3 Two INV2500-HS inverter modules in an INVR2U-HS shelf are connected in parallel in the shelf and become an inverter system with a 115VAC output at 5,000 volt-amperes (44A).

7.4 **For the purpose of this manual, the INV5000-HS-230 and two INV2500-HS modules in an INVR2U-HS shelf are both 5,000 VA inverter systems and will be referred to as an INV5000-HS where the generic meaning is conveyed.** While the two different shelves are identical in size and appearance, they differ in their internal module connection (series or parallel).

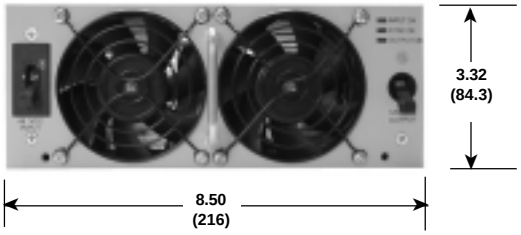
8.0 FRONT AND BACK PANEL DESCRIPTIONS

8.1 Figure 2 shows the front and back of an INV2500-HS inverter module. On the left side of the front panel of the INV2500-HS is the input circuit breaker. To the right are the two cooling fans and the output circuit breaker. Above the output breaker from the top are the green LED indicators for Input OK, Sync OK and Output OK.

8.2 On the INV2500-HS back panel on the right side is the hot-swap connector which contains all power and signal connections.

8.3 Figure 3 shows the front and back of an INV5000-HS. Each front half (side A

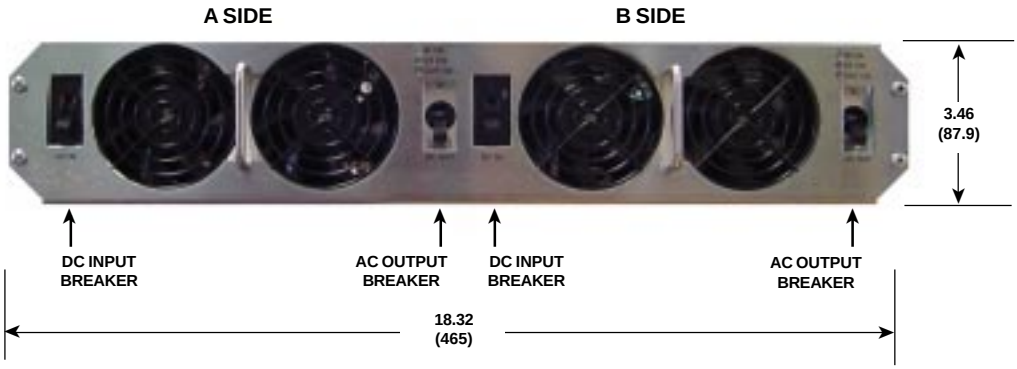
INV2500-HS FRONT VIEW



INV2500-HS BACK VIEW

Figure 2. Front and Back of INV2500-HS Module

INV5000-HS FRONT VIEW



INV5000-HS BACK VIEW

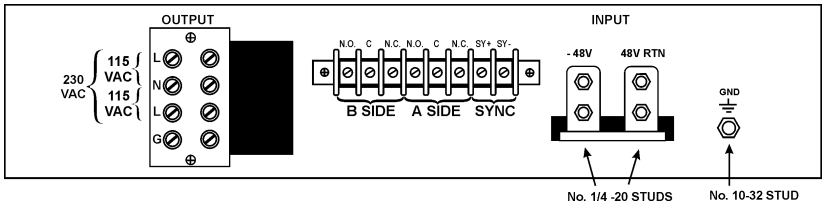


Figure 3. Front and Back of INV5000-HS System

or side B) of this inverter is a INV2500-HS. The back panel has a transparent plastic safety cover. The INVR2U-HS shelf with two INV2500-HS inverters in it is identical in appearance and dimensions to the INV5000-HS, both front and back. Both units have a front retention panel over the INV2500-HS modules.

8.4 On the INV5000-HS back panel to the left are the AC output screw terminals. At the center is a terminal strip with the Form C relay contacts N.O., C and N.C. for each side (A and B) of the inverter. To the right are the input bus bars with no. 1/4-20 studs. At the lower far right is the no. 10-32 stud chassis ground connection.

9.0 ELECTRICAL SPECIFICATIONS

Specifications typical at 48V input, full load and 25°C unless otherwise noted. Asterisk (*) means specification is same as center column.

	INV2500-HS	2 INV2500-HS IN INVR2U-HS	INV5000-HS-230
INPUT			
Voltage Range	*	42-56 VDC	*
Input Current, Full Load, 48VDC	<60A DC	<120ADC	<120ADC
Input Current, No Load, 48VDC	<1A DC	<2ADC	<2ADC
Input Protection	*	100A Circuit Breaker(s)	*
EMI Filter, Conducted	*	FCC2078 pt.15J Curve A EN55022 Curve A	*
Voice Band Noise/ A-H Battery	<32dBrnC/240	<32dBrnC/480	<32dBrnC/480
OUTPUT			
Voltage, Full Load	115VAC	115VAC	230VAC
Voltage, No Load	120VAC	120VAC	240VAC
Current, Max.	22A RMS	44A RMS	22A RMS
Frequency, ± 0.1%	*	50 or 60Hz	*
Total Harmonic Distortion	*	<2%	*
Load Crest Factor	*	2.8 to 1	*
Output Protection	*	25A Circuit Breaker(s)	*
Surge Capability	*	Up to 300%	*
Reactive Loads	*	+90° to - 90° Phase Angle	*
Efficiency	*	90%	*
SAFETY STANDARDS	*	UL1950, CSA22.2 No.950, EN60950	*
STATUS INDICATORS			
Input OK	*	Green LED	*
Sync OK	*	Green LED	*
Output OK	*	Green LED	*
Form C Relay Alarm Contacts	*	Inverter Fail Alarm	*

ENVIRONMENTAL

Operating Temp. Range	*	0°C to 70°C *
Output Current Derating	*	2.5%/°C, 50°C to 70°C *
Storage Temp. Range	*	-40°C to +85°C *
Humidity	*	0% to 95%, Non-Condensing *
Cooling	*	Internal Fans *

PHYSICAL SPECIFICATIONS

Case Material	*	Aluminum *
Finish, Front Panel & Shelf	*	Powder Coat Gray *

Dimensions, Inches (mm)

INV2500-HS	3.32 H x 8.50 W x 12.00 D (84.3 x 216 x 305)
INVR2U-HS Shelf	3.46 H x 18.32 W x 16.38 D (87.9 x 465 x 416)
INV5000-HS-230	3.46 H x 18.32 W x 16.38 D (87.9 x 465 x 416)

Rack Mounting Width * 19 or 23 Inches *

10.0 MECHANICAL DIMENSIONS OF SHELVES

Figure 4 shows the mechanical dimensions for the INVR2U-HS and INV5000-HS shelves. The shelves are identical at 16.38 inches (416mm) deep; with the rear plastic cover they are 18.00 inches (457mm) deep.

11.0 SAFETY AND INDUSTRY STANDARDS

11.1 The INV2500-HS and INV5000-HS inverters meet the following safety certifications:

STANDARD	AGENCY
UL1950	UL
CSA22.2 No.950	CUL
EN60950	DEMKO

11.2 The INV2500-HS and INV5000-HS inverters are CE marked to indicate conformance to the European Union's Low Voltage Directive.

11.3 Input conducted EMI meets FCC20780 part 15J Curve A and EN55022 Curve A.

11.4 Input voice band noise is less than 32dBrnC for a single INV2500-HS with a 240 ampere-hour battery or an INV5000-HS or two INV2500-HSs with a 480 ampere-hour battery.

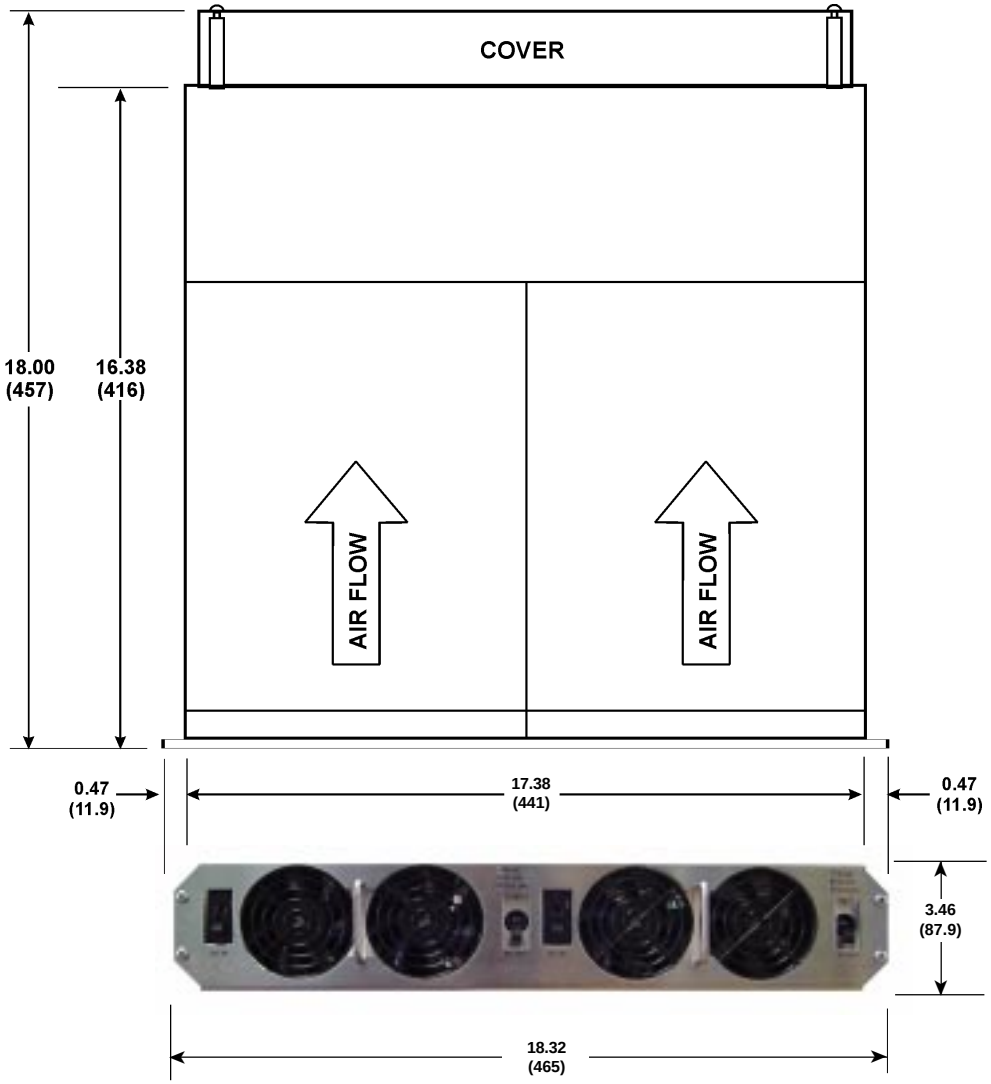


Figure 4. Mechanical Dimensions of INV5000-HS & INVR2U-HS Shelves

12.0 OPERATING INFORMATION

12.1 Input Voltage. These telecom inverters operate off a nominal 48VDC input source which may be a battery or other DC source. The input voltage range is 42 to 56VDC. Input connections on the back of the INV5000-HS and INVR2U-HS are to bus bars with no. 1/4-20 studs.

12.2 Output Voltage. The output voltage for an INV2500-HS is 115VAC at full load, 120VAC at no load; for an INV5000-HS-230 it is 230VAC at full load, 240VAC at no load. See Figure 5(a). Frequency is 50 or 60Hz, ±0.1%. The output voltage has total harmonic distortion of less than 2.0%. The load current crest factor is 2.8 to 1, and surge capability is up to 300%. The output will drive reactive loads with up to ±90° phase angle. The output connectors are screw terminals on the back of the INV5000-HS or INVR2U-HS.

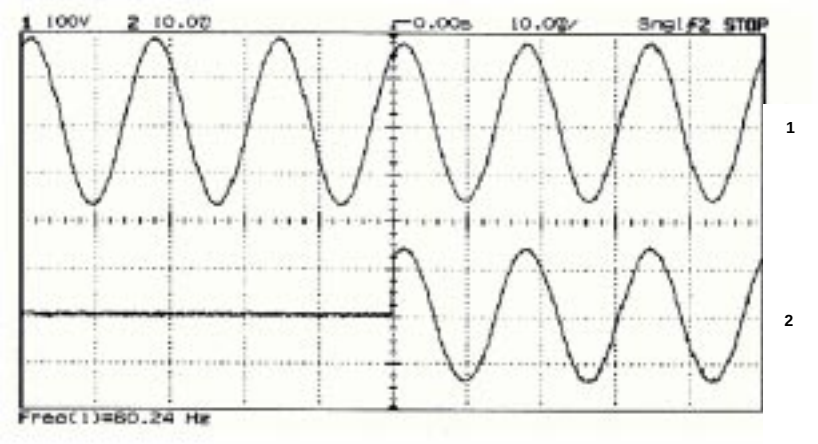
12.3 Output Power. Maximum output power for an INV2500-HS is 115VAC at 22A RMS giving a maximum of 2530 volt-amperes. For an INV5000-HS it is 230VAC at 22A RMS, giving a maximum of 5060 volt-amperes. Exceeding these values may cause electronic shutdown of the output. Full output power is produced at up to 50°C ambient temperature. Above this, output current must be derated at 2.5%/°C. Maximum operating temperature is 70°C, at which the output current must be derated by 50%.

12.4 Overload Characteristic. These inverters incorporate electronic shutdown circuitry; shutdown takes place during an overload, before the output circuit breaker trips. Figure 5 shows INV2500-HS output voltage and current waveforms for a full load step, sudden overload, and short circuit. Figure 6 shows shutdown time versus output current for both the INV2500-HS and INV5000-HS. Below is a table that shows the same data in a different format:

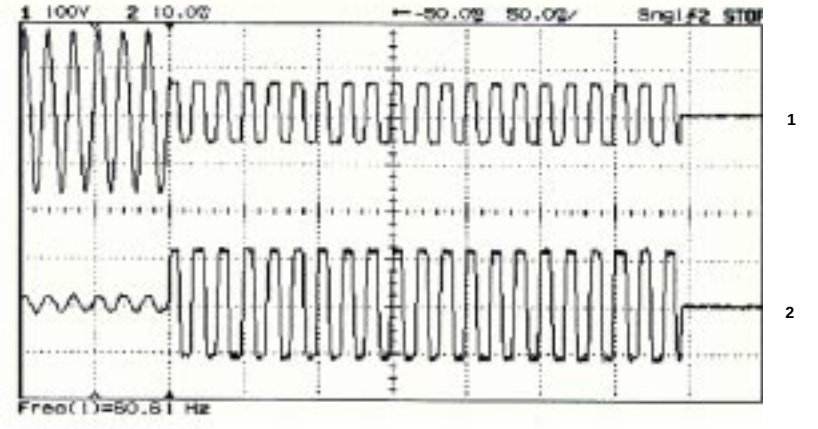
Table 12-1. Typical Load Current vs. Shutdown Time

PERCENT OF RATED LOAD	SHUTDOWN TIME
114-173%	10 sec.
173-223%	1 sec.
223-318%	0.25 sec.

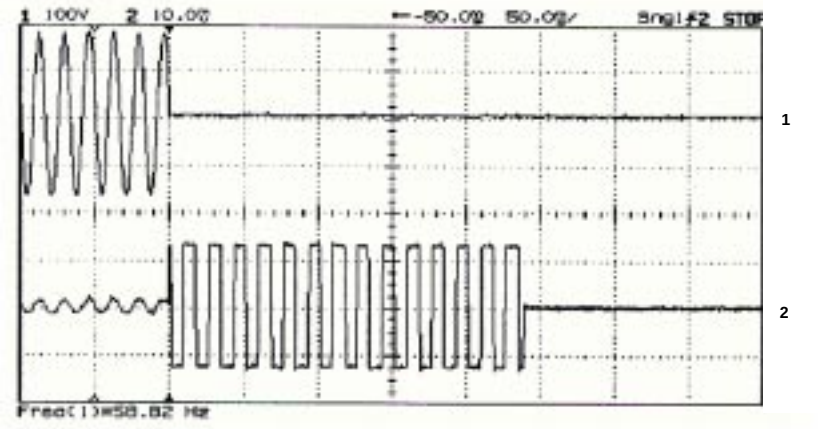
As the table shows, the INV2500-HS and INV5000-HS are capable of handling large output surge currents, specifically more than three times rated output current for 1/4 second, more than twice rated output current for 1 second and more than 1.5 times rated output current for 10 seconds. If the surge exceeds approximately 318% of rated output current or exceeds the



(a) Full Load Step. Vo (top) & Io (bot@20A/cm).



(b)Sudden Overload Applied. Vo (top) & Io (bot @ 50A/cm).



(c) Short Circuit Applied. Vo (top) & Io (bot @50A/cm).

Figure 5. INV2500-HS Inverter Output Waveforms

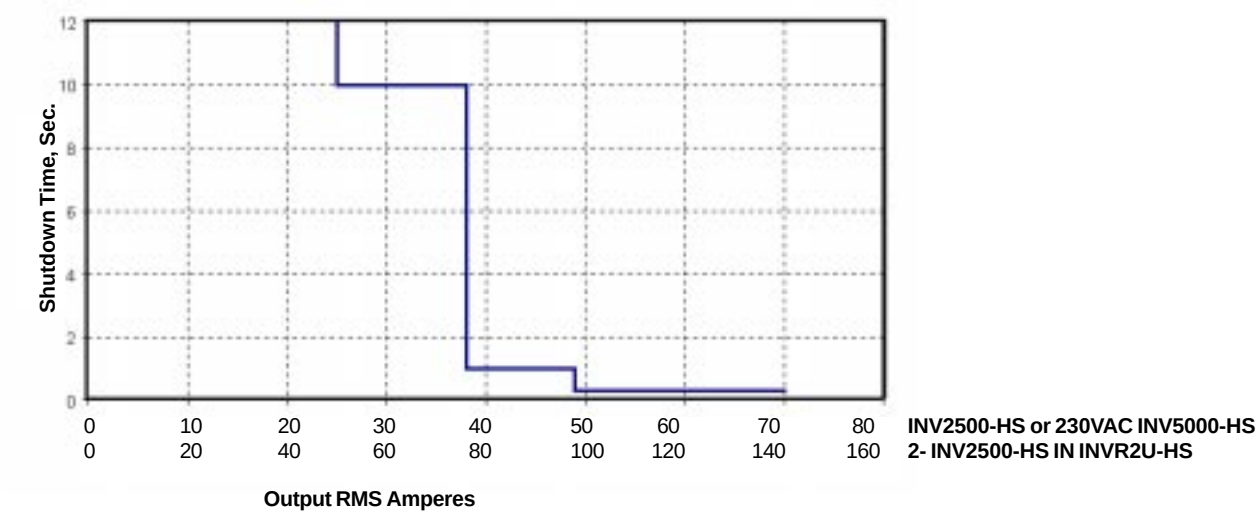
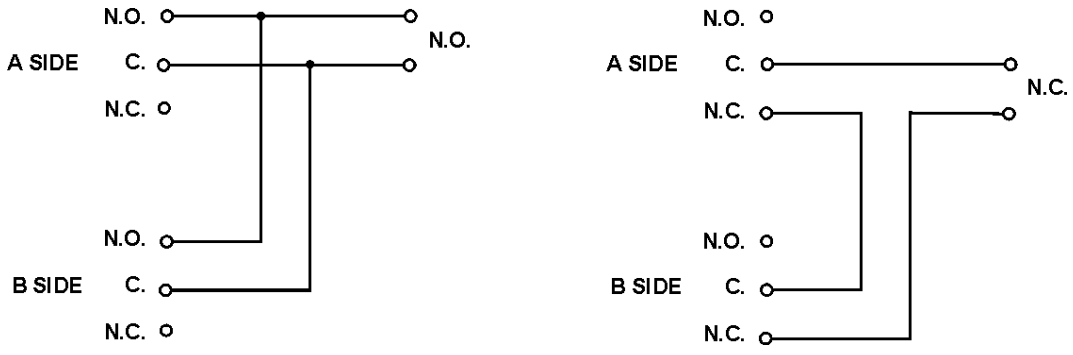


Figure 6. INV2500-HS & INV5000-HS Overload Characteristic.



(a) Normally Open **(b) Normally Closed**

Figure 7. Connections for ORing Form C Relay Outputs

shutdown times shown in the table, the output will be shut down and must be reset by turning both input and output circuit breakers off. After this, the input breaker(s) should be turned back on (up position); after the Output OK LED(s) come on the output breaker(s) should be turned back on (up position).

12.5 Grounding. The DC input ground, AC output ground, AC neutral and chassis ground are all in common. The chassis ground should be connected to system ground.

12.6 Status Indicators. Three green LEDs indicate the operating status of each INV2500-HS inverter module. They are (from top to bottom): Input OK, Sync OK and Output OK.

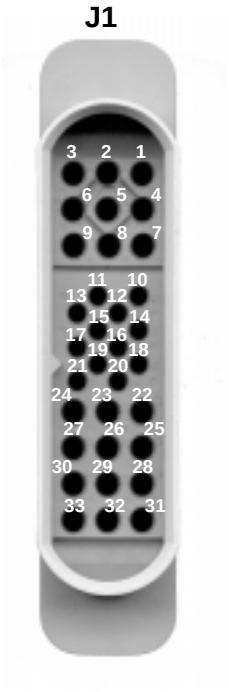
12.7 Form C Relay Contacts. These contacts have normally open (N.O.) and normally closed (N.C.) positions for normal operation of each inverter. See Figure 3 for connections. Note that there is a separate set of contacts for each half (A and B sides) of the inverter. If it is desired to monitor the inverter as a whole, the two sets of contacts may be connected as shown in Figure 7 to give an OR function for either set of contacts.

12.8 Sync Connections. There are +Sync and -Sync terminals on the terminal block. When two or more inverters are connected in parallel these Sync terminals must be connected together, observing the polarities.

12.9 Inverter Module Connections. If the INV2500-HS inverter module is operated or tested separately from the shelf, connections should be made to the J1 connector with a mating connector and the pin connections given in Figure 8.

13.0 PARALLEL OPERATION

13.1 The INV2500-HS and INV5000-HS Series inverters are designed to operate in parallel for higher output current. For the INV2500-HS, the units are automatically connected in parallel in the INVR2U-HS shelf. The INV5000-HS 230VAC units have two INV2500-HS inverters connected in series in the shelf. Two or more INV5000-HS-230 inverters may be connected in parallel for additional output power or for N+1 redundant operation. This is done by connecting all inputs in parallel and all outputs in parallel (line, neutral, line), although the DC inputs could come from two separate sources. In addition, the sync terminals must be connected together, +Sync to + Sync and -Sync to -Sync. The Sync terminals are used only for parallel connection of two or



J1 Connector:
Positronics GFSH01M182

Mating Connector:
Positronics GFSH01F10
Contacts No. FC112N2 for
Pins 1, 3, 5, 7, 8, 25-28 and 30-33.
Conacts No. FC720N2 for
Pins 14-18.

J1 Connections

PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
1	AC Line	12	NC	23	NC
2	NC	13	NC	24	NC
3	AC Line	14	+Sync	25	+DC In
4	NC	15	-Sync	26	-DC In
5	AC Neutral	16	Form C: NC	27	-DC In
6	NC	17	Form C: C	28	+DC In
7	AC Ground	18	Form C: NO	29	NC
8	AC Neutral	19	NC	30	-DC In
9	NC	20	NC	31	+DC In
10	NC	21	NC	32	+DC In
11	NC	22	NC	33	-DC In

NC = No Connection

Figure 8. Inverter Module Pin Connections

more inverters. Current sharing between paralleled inverters is ±10%.

13.2 Alternatively, separate sources may be used for the inputs to these inverters while the outputs are connected in parallel. In either case, output loads should have individual distribution circuit breakers. The following table shows output current and total volt-amperes for inverters connected in parallel. As mentioned earlier, INV5000-HS refers to both the 230VAC INV5000-HS-230 and two INV2500-HS inverters in an INVR2U-HS shelf producing 115VAC.

Table 13-1. Output For Paralleled Inverters

NO.OF INV2500-HS INVERTERS	KVA RATING	OUTPUT AMPS
1	2.5	22
2	5.0	44
3	7.5	66
4	10.0	88

NO.OF INV5000-HS INVERTERS	KVA RATING	115VAC AMPS	230VAC AMPS
1	5.0	44	22
2	10.0	88	44
3	15.0	132	66
4	20.0	176	88

13.3 Four INV2500-HS inverters in two INVR2U-HS shelves connected in parallel could be used to produce 10 kilovolt-amperes of 115VAC or could also be used as a 3+1 redundant inverter providing 7.5 kilovolt-amperes of 115VAC to a load.

13.4 Figure 9 shows four INV2500-HS inverter modules in two INVR2U-HS shelves connected in parallel to give 10KVA of AC output at 115VAC. The AC output is distributed by a DPAC1UT AC Distribution Panel made by UNIPOWER Telecom. Note that only 115VAC inverters can be used with the DPAC1UT distribution panel and not the 230VAC INV5000-HS-230. 230VAC INV5000-HSs require breakers on both line sides, and this is not available with the DPAC1UT. Note also that only the “T” (Terminal Strip) Option of the DPAC1U can be used with these inverters and that, as shown in Figure 9, the A side AC input terminals must be strapped in parallel, i.e., A1G to A2G, A1N to A2N and A1L to A2L; in the same way, the B side AC input terminals must also be strapped in parallel.

14.0 INSTALLATION AND TESTING

14.1 The inverter or inverters should be initially tested in their shelves. For 23-inch rack mounting use panel extenders.

14.2 Put all input and output circuit breakers in the off (down) position. See Figure 3. Remove the rear plastic safety cover.

14.3 Connect the input battery to the -48VDC and 48VDC Return input bus bars

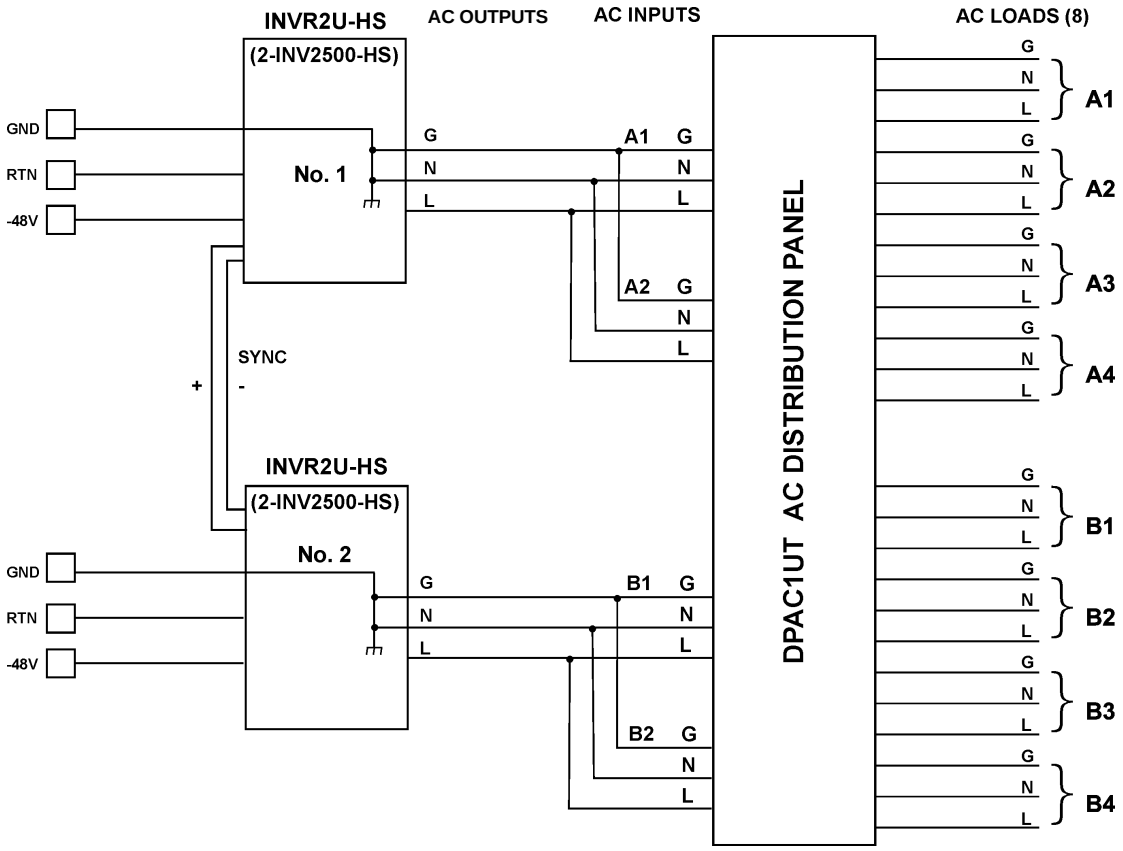


Figure 9. Two 115VAC INVR2U-HSs in Parallel Using AC Distribution Panel

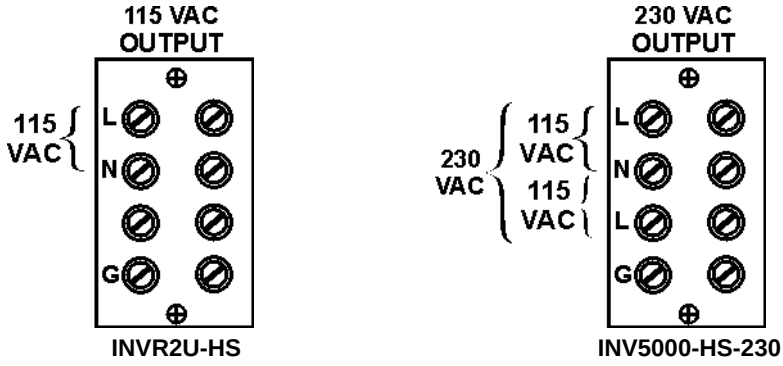


Figure 10. Output Connections for Inverters

by means of the 1/4-20 studs. Connect the input ground (10-32 stud) to the system ground. Make sure the correct polarity is used and make sure the connections are clean and firm. Reversed input polarity could cause damage to the inverter.

14.4 Connect the AC output cable to the proper output screw terminals. See Figure 10 for the correct connection for 115 or 230VAC output versions. Connect a load of approximately 10 amperes across the output of the inverter.

14.5 To power up the inverter, turn the A side (left) DC input circuit breaker on by moving the toggle to the up position. The A side fans and input OK and Sync OK LEDs should come on followed by the Output OK LED approximately four seconds later. After the Output OK LED is on, turn on the A side AC output breaker by placing the toggle in the up position. Next, turn the B side (right) DC input breaker on. The B side fans and Input OK and Sync OK LEDs should come on followed by the Output OK LED approximately four seconds later. After the Output OK LED is on, turn on the B side AC output breaker. Check the AC voltage across the load with a digital AC voltmeter. The voltage should be between 115 and 120VAC or between 230 and 240VAC, depending on the model.

14.6 Check the Form C Relay contacts with an ohmmeter. See Figure 3. Measure the resistance between the N.O. contacts and C contacts. They should indicate an open. Measure the resistance between the N.C. contacts and the C contacts. They should indicate a short.

14.7 Turn off the AC output circuit breakers first, followed by the DC input breakers, by placing the toggles in the down position. Test each inverter in the manner described above.

15.0 INVERTER APPLICATION

15.1 In the actual application of the inverter, follow the procedure in sections 14.2 through 14.6, except the inverter should be connected to its actual load. The loads connected to the output of the inverter should always have their own individual circuit breakers. Make connections to the Form C relay contacts as required. Then re-install the rear plastic safety cover.

15.2 For two or more inverters in parallel, make the input and output connections to the inverters as described in Section 13.0. See Figure 9. Put all output distribution circuit breakers in the off position. Connect the sync terminals together observing proper polarity.

15.3 Take one of the inverter modules and turn the DC input circuit breaker on; then after the Output OK LED has come on turn the AC output circuit breaker on. This sequence must be performed for the inverter A side and then the B side. Repeat this for each paralleled inverter in turn until all inverters are on. Make sure that the three green LEDs are on for each inverter.

15.4 With all inverters on, turn on each AC output distribution circuit breaker. The inverters will automatically share output currents to an accuracy of ± 10%.

16.0 REPLACING AN INVERTER MODULE

16.1 The following instructions are for replacing an INV2500-HS inverter module in an INVR2U-HS shelf.

16.2 The inverter module may be field replaced only in an INVR2U-HS shelf, i.e., when it is parallel connected for 115VAC output. For the INV5000-HS-230 inverters, the replacement must be done at the factory due to the complexity of the series connection of the inverter modules.

16.3 When the INV2500-HS inverters are operated in a N+1 redundant mode, only the inverter module being replaced needs to be turned off as described in the following paragraphs. In this case it is true hot-swap replacement. If the 115VAC INVR2U-HS is operated with two modules at its full 5,000 volt-ampere load, then both modules should be shut down in the manner described in paragraph 16.4. When starting up after replacement, both inverter modules must be turned on as described in paragraph 16.5.

16.4 Perform the following steps on the inverter module to be removed:

16.4.1 Turn off the AC output breaker (down position).

16.4.2 Turn off the DC input breaker (down position).

16.4.3 Remove the front retention panel by removing the four Phillips screws.

16.4.4 Remove the inverter module from its shelf.

16.5 To put a new inverter module in place, perform the following steps:

16.5.1 Make sure the input and output breakers of the new inverter module are in the off (down) position.

16.5.2 Install the replacement inverter module in the shelf.

16.5.3 Replace the front rention panel by replacing the four Phillips screws.

16.5.4 Turn on the DC input breaker (up position).

16.5.5 After the Output OK LED comes on, turn on the AC output breaker (up position).

16.5.6 All green LEDs on the inverter modules should now be on, indicating normal operation.

17.0 MAINTENANCE

No routine maintenance is required on the INV2500-HS or INV5000-HS Series inverters except for a periodic cleaning of dust and dirt around the front fans and rear ventilation holes. A small vacuum nozzle should be used for this.

18.0 TROUBLESHOOTING GUIDE

18.1 If you encounter difficulty in getting the inverter(s) to operate, go through the following troubleshooting guide.

18.2 Table 18-1. Inverter Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSES	ACTION TO TAKE
Input OK LED does not come on.	Bad connection to input battery; input breaker not on.	Check the connection to battery; check battery voltage; check that input breaker is on.
Sync OK LED does not come on for	Bad connection to sync terminals.	Check that sync connection has been made to all paralleled inverters with proper polarity.
No AC output; Output OK LED does not come on.	Bad output connection; output breaker not on.	Check output connection to load; check that output breaker is on; check that AC distribution breakers are on.
No AC output. Output OK LED is off.	Short circuit or overload on output.	Remove short circuit or overload. Turn off input and output circuit breakers. Turn input circuit breaker back on, wait for the Output OK LED to come on, then turn the output circuit breaker on.
No output. Both circuit breakers on. Input and Output OK LEDs off.	Input battery voltage is below range.	Check battery voltage. Recharge battery or install new battery. Turn the inverter back on.

18.3 If none of the above actions solves the problem, call UNIPOWER Telecom at 954-346-2442 Ext. 400 for help.